

Remarks

Claims 58-62 have been canceled without prejudice or disclaimer and no claims have been amended or newly added. Therefore, claims 1-6, 8-25, 27-44, and 46-57 are pending. In view of the following comments, allowance of all the claims pending in the application is respectfully requested.

Rejection Under 35 U.S.C. §§ 102 and 103

Claims 58-62 were rejected under 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a) as allegedly anticipated by, or obvious over, U.S. Published Application No. 2005/0136334 to Dierichs et al. ("Dierichs"). Claims 58-62 were also rejected under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) as allegedly anticipated by, or obvious over, U.S. Published Application No. 2003/0058422 to Loopstra et al. ("Loopstra").

Claims 1-6, 8-13, 15-25, 27-32, and 34-38 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over U.S. Patent No. 5,902,705 to Okamoto et al. ("Okamoto"), in view of U.S. Patent No. 6,583,068 to Yan et al. ("Yan"), and further in view of U.S. Published Application No. 2003/0147058 to Murakami et al. ("Murakami").

Claims 14 and 33 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Okamoto, in view of Yan, in view of Murakami, and further in view of U.S. Published Application No. 2005/0040413 to Takahashi et al. ("Takahashi").

Claims 39-44, 46-51, and 53-57 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Yan in view of Murakami.

Claim 52 was rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Yan, in view of Murakami, and further in view of Takahashi.

Applicant traverses these rejections.

I. Claims 1-6, 8-25, 27-44, and 46-57

Claim 1 recites, in part, that:

the patterning structure comprises an aluminium absorber layer with a protective top coating having a thickness of about 0.1 nm to about 5 nm and wherein the patterning structure improves imaging by eliminating or at least minimising the formation of aberrations in the patterned beam.

Pages 4-5 of the Office Action concedes that Okamoto does not disclose these claimed aspects. Pages 5-6 of the Office Action alleges that Yan discloses "an aluminum absorber layer, and a top protective layer" (Yan: col. 2, lines 18-65; col. 3, lines 4-26; and Fig. 1(e)). However, page 6 of the Office Action *concedes* that "Yan does not disclose that the protective top coating has a thickness of about 0.1 nm to 5 nm." Page 7 of the Office Action alleges that Murakami discloses a "protective top coating [that] can grow to a thickness of 2 nm on the absorbing-body layer (absorber layer)" and that therefore the claimed invention of claim 1 is obvious in view of the cited portions of Okamoto, Yan and Murakami.

Respectfully, Applicant disagrees that the cited portions of Murakami overcome the shortcomings of the cited portions of Yan and Okamoto at least because the top layer of Yan and the protective coating of Murakami are for fundamentally different purposes. For example, Murakami discloses that "[t]he **protective layer exhibits reflective behavior** in the same manner as a first layer, and **thus imparts no reflectivity decrease to the optical element** compared to otherwise similar optical elements that lack a protective layer." ¶ 22 of Murakami (emphasis added).

This is in complete contradiction to Yan, which discloses that the top layer is designed to have a higher absorbance and/or lower reflectivity than the absorber layer, which in turn is has a higher absorbance and/or lower

reflectivity than the multi-layer mirror underneath the absorber layer. See Yan, col. 3, lines 27-32. The effect of this is to improve contrast of the mask at UV/DUV wavelengths. See Yan, e.g., col. 5, lines 33-36.

Page 12 of the Office Action alleges that "the teaching of Murakami, wherein a very thin protective layer is formed on the absorber layer, is not at all contradicting to the teaching of Yan et al." However, Yan requires a top layer of a significant thickness to provide the high absorption and/or low reflection needed to improve contrast at UV/DUV wavelengths. For example, Yan discloses that the top layer is usually, but not always, thinner than the absorber layer, the absorber layer being in the range from 45-215 nm. A person skilled in the art would readily understand from this disclosure that to provide the improved contrast in Yan the thickness of the top layer cannot be so small that it cannot effectively provide the needed high absorption and/or low reflection. In contrast, the Murakami protective layer is reflective and/or photocatalytic and there appears to be no disclosure that the Murakami protective layer has high absorbance and/or low reflectance to be suitable for the Yan structure.

Therefore, the Office Action's reliance on Murakami is improper because the proposed modification would render Yan unsatisfactory for its intended purpose of improving the contrast of the mask. See MPEP § 2143.01(V) ("If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification") (citation omitted).

Furthermore, the Office Action has not set forth a proper reasoned basis for having an "aluminium absorber layer with a protective top coating having a thickness of about 0.1 nm to about 5 nm." While Yan discloses an aluminum absorber layer with a top layer having a thickness far exceeding

the claimed range and Murakami discloses an absorber layer of different material with a thin protective layer, the Office Action has not set forth a proper reasoned basis for the modification and combination of the teachings.

As discussed above, Yan discloses an aluminum absorber layer with a top layer having a thickness far exceeding the claimed range. There is no reasoning set forth in the Office Action to provide a thinner layer and, as noted above, the protective layer of Murakami is contradictory to the Yan structure. A person skilled in the art viewing the need in Yan's structure of improved contrast would not look to make the top layer thinner.

Further, the cited portions of Murakami teach to have the thin protective layer over an absorbing layer of material other than aluminum. Murakami discloses a protective layer 1 having a thickness of 2.3 nm formed over a low-Z layer 2 of the multilayer film of the mirror shown in Fig. 1. ¶ 56. However, the low-Z layer 2 is not an aluminum absorber layer. In addition, Murakami discloses five "Working Examples." ¶ 92-101. Working Examples 1 and 3-5 disclose that protective layers 104b and 204 (the protective layers on the absorbing-body layers) have a thickness of 7 nm. In addition, Working Example 2 discloses that the absorbing-body layer 203 is made of Ta rather than Al, as recited in claim 1. Accordingly, the disclosed thickness of the protective layers in Murakami fails to anticipate or render obvious the thickness of the claimed protective top coating and indeed, teach away by having a thin protective layer over an absorber material other than aluminum.

For *at least* the reason that the cited portions of Okamoto, Yan, and Murakami fail to disclose or render obvious all of the aspects of the claim 1, the rejection of claim 1 should be withdrawn. Claims 20, 39 and 55 include similar subject matter, among other things, and are patentable for similar reasons as discussed above. Accordingly, the rejection of claims 20, 39 and

55 should be withdrawn for similar reasons as noted above with respect to claim 1.

Claims 2-6, 8-19, 21-25, 27-38, 40-44, 46-54, 56, and 57 depend from claims 1, 20, 39 or 55 respectively and therefore are also patentable over the references by virtue of their dependency from claims 1, 20, 39 and 55 respectively, as well as for the features they recite individually. Further, the cited portions of Takahashi fail to provide any relevant disclosure with respect to claims 1, 20, 39 and 55 as Takahashi is merely cited as allegedly disclosing a barrier layer between high and low index refraction material.

II. Claims 58-62

Claims 58-62 were canceled without prejudice or disclaimer solely to expedite prosecution. Accordingly, the rejection of claims 58-62 is moot.

Conclusion

Having addressed each of the foregoing rejections, it is respectfully submitted that a full and complete response has been made to the outstanding Office Action and, as such, the application is in condition for allowance. Notice to that effect is respectfully requested.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

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Respectfully submitted,

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